Sandbagging for Flood Protection

Lake County Stormwater Management Commission

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General Safety Precautions

- Filling sandbags is a two or three-person operation. Rotate people to avoid muscle strain and injury.
- Use proper lifting techniques: lift with your legs, bend at your knees, kneel or sit while holding the bag.
- Dress in layers
- Reflective at night
- Work gloves
- Safety goggles
- Sun protection
- Food and water

Typical Flood Response Injuries

- Physical and mental stress
- Heat- and Cold-related injuries
- Sprains
- Strains
- Lacerations
- Blisters

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Dangers of Flood Response

- Icy/muddy conditions
- Working around electrical equipment and machinery
- Swift water movement
- Contaminants
- Temperature (hot and cold)
- Debris
- Sand boils

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Sandbag Size and Fill Materials

- Bag sizes can vary
- Fill with any earth material
- Sand is easiest to handle
- **DO NOT OVERFILL!**
- Typically filled approximately ½ to 2/3 full
- Limit filled bag weight to 35-40 pounds
- **Do <u>not</u> need to be tied, although they may be tied near the <u>top</u>**

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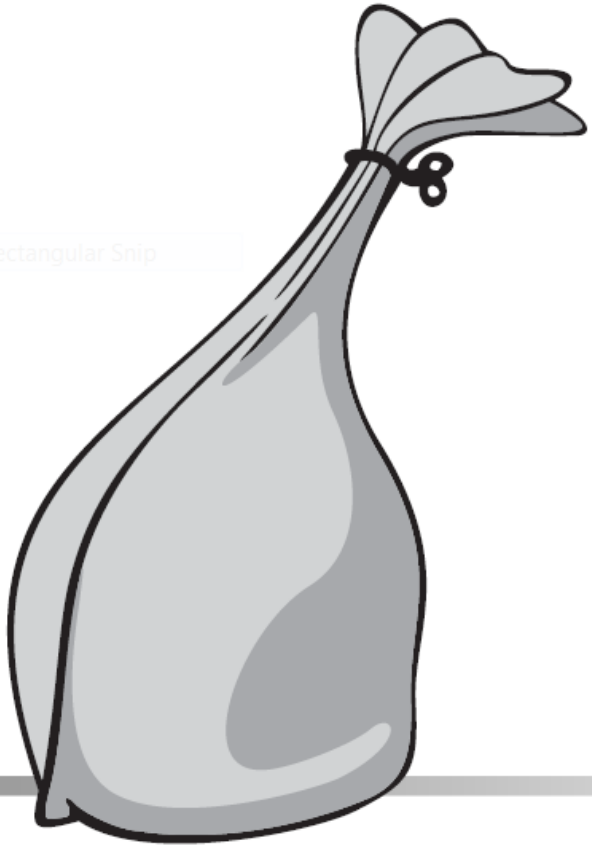

YES! Fill the sandbag about one-half full and tie near the top, if it needs to be tied

NO! Sandbag filled too full

NO! Sandbag tied too low

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Tied Sandbags

- Advantages
  - Dependable – no spillage
  - Adaptable – mobile

- Disadvantages
  - More Labor Intensive
  - Slower to Construct
  - Promotes overfilling

Un-tied sandbags are faster and less labor intensive. Diagonal Pass.

Site Selection and Preparation

- Consider the ground elevation, ground condition, obstructions, and alignment
- For stability, the barrier should be kept as short and low as possible
- Do NOT build against a building wall
- If possible, plan to leave at least 8 feet between the base of the barrier and any building or obstructions
- Interior drainage and pumping

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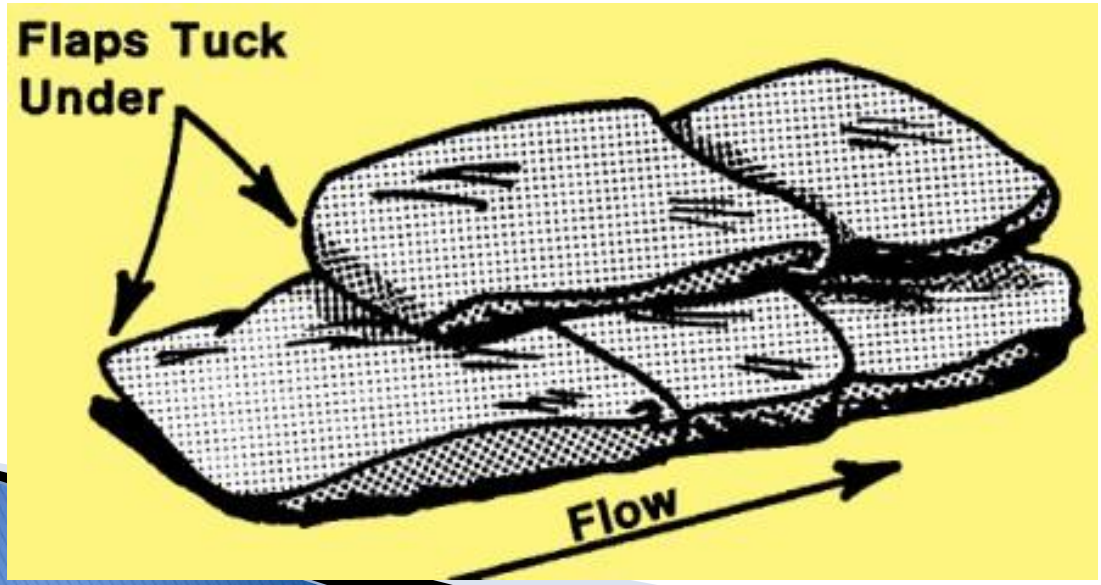
Stacking Sandbags

- Place flat and lengthwise with the barrier
- Stagger in all three directions
- Avoid continuous joints
- Tuck flaps under the bag
- Foot-tamp compaction to minimize gaps



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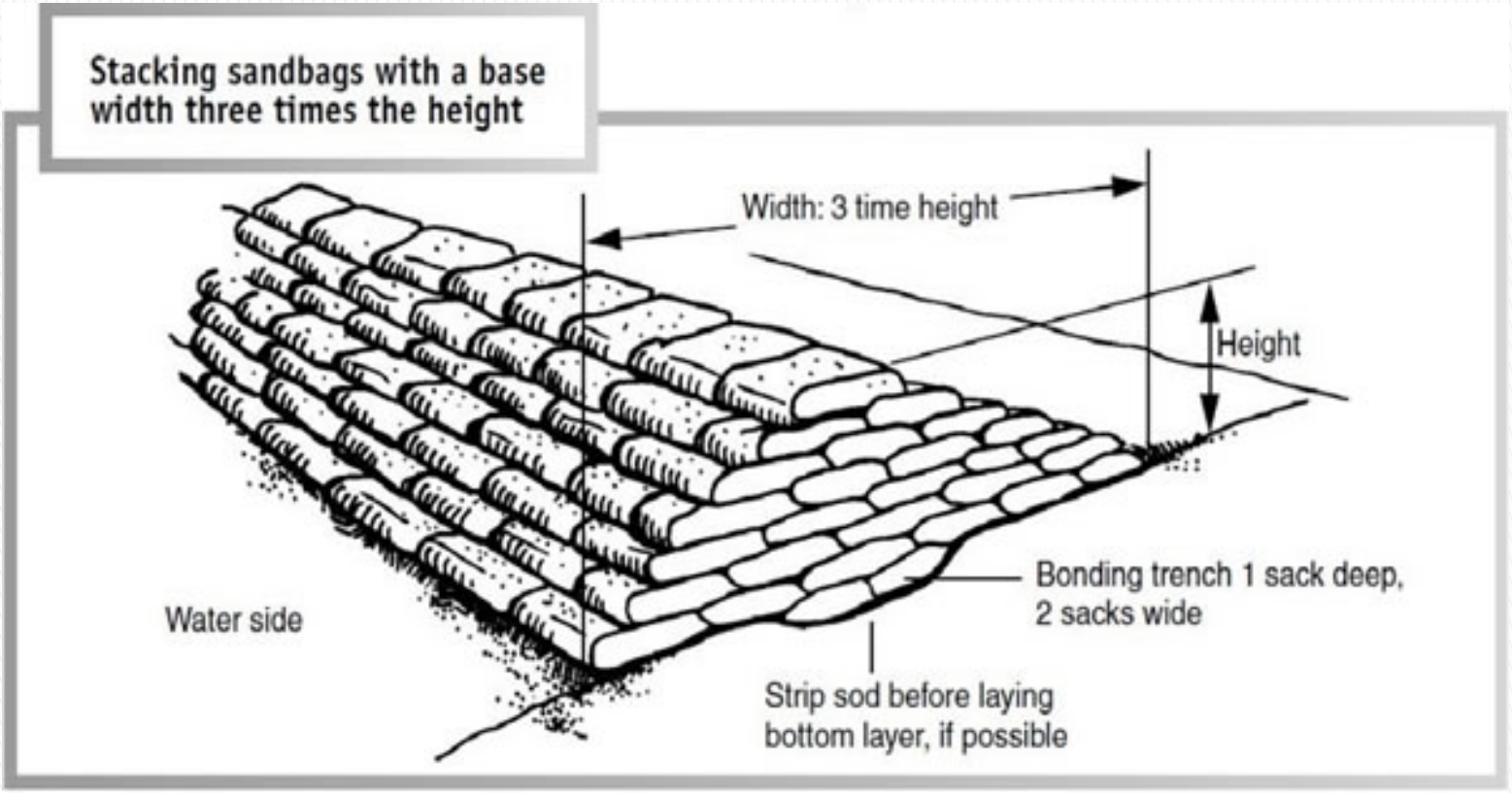
Pyramid Stacking

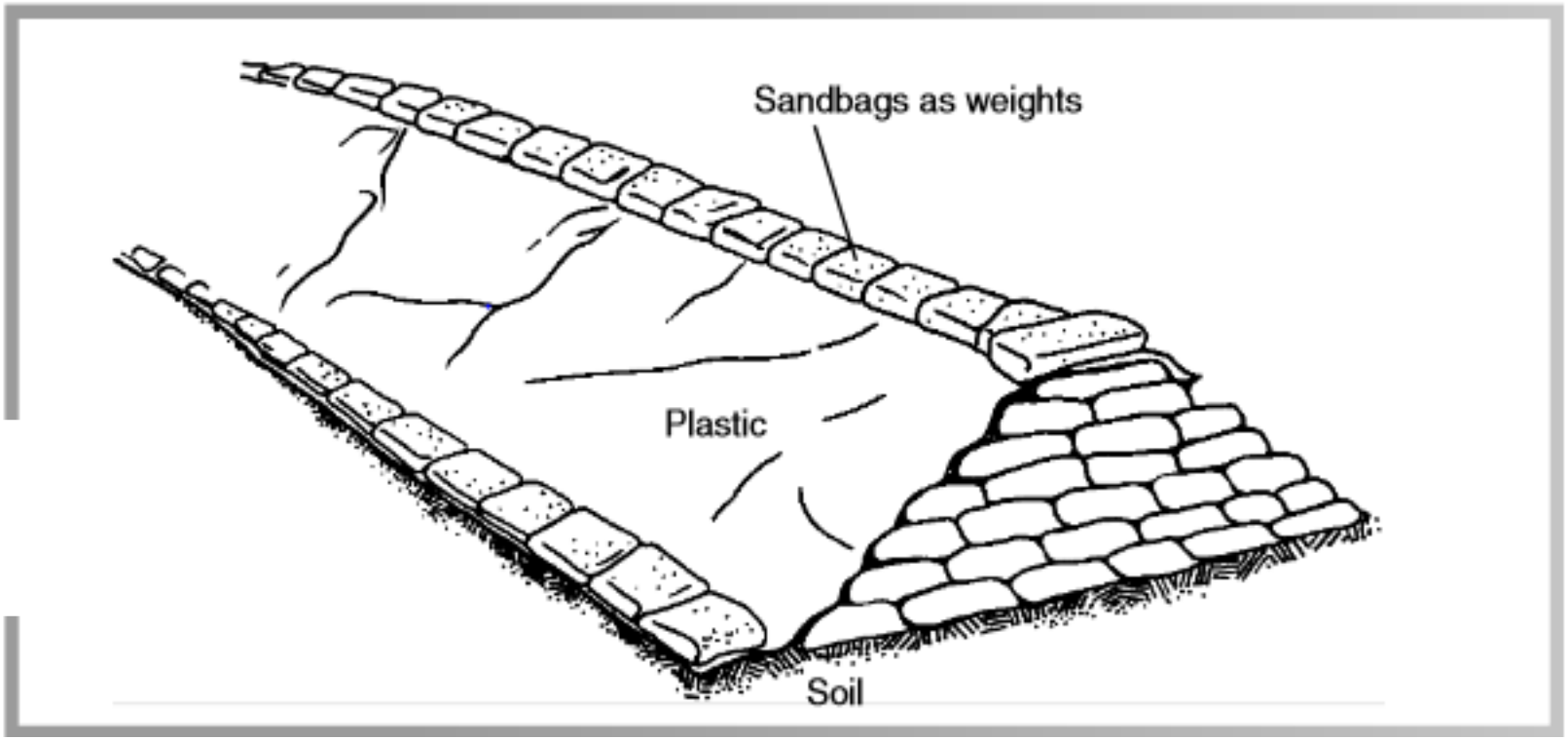


3 to 1 Base/Height Ratio

Single Row Stacking

- Limit barrier height to no more than a few bags due to instability and hydrostatic pressure
- Proper placing, staggering very important
- Use in flooded backwaters
  - No streamflow velocity
  - No moving/floating debris

Stacked Sandbags with Plastic Sheeting



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Materials Needed per 100' Barrier

Barrier Height	Sandbags Required	Tons of (wet) Sand Required	Cubic Yards of Sand Required
1 foot	600	12	7
2 feet	1,000	20	12
3 feet	2,100	42	25
4 feet	3,600	72	42

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Flood Fight Problems

HANDBOOK

FOR

EMERGENCY FLOOD

PROTECTION

US Army Corps
of Engineers

U. S. Army Corps of Engineers
Chicago District
111 North Canal Street
Suite 600
Chicago, Illinois 60606

Overtopping

Occurs when the water level exceeds the crest elevation of a sandbag barrier.

"Freeboard" is the difference between the forecasted high water level and the lowest point along the top of the sandbag barrier.

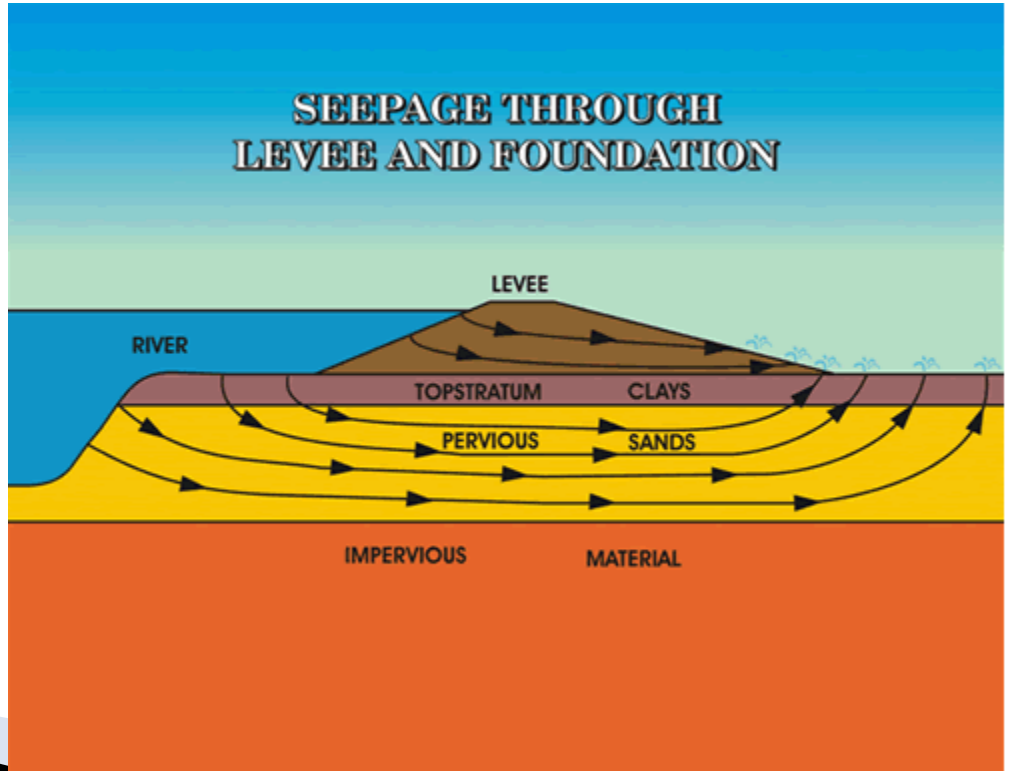
Use 1 to 2 feet
of freeboard.

Check for low spots.

Seepage

Percolation of water through or under the barrier.

Seepage is almost impossible to eliminate and any attempt to do so may create a much more severe condition.



Sand Boils

Occurs when the water pressure becomes so extreme that ground water forces its way to the surface, "boiling" out on the interior protected side of a sandbag barrier.

Small clear seepages are common and not cause for alarm.

Dirty/muddy boils indicate underground erosion and weakening of the subsurface.

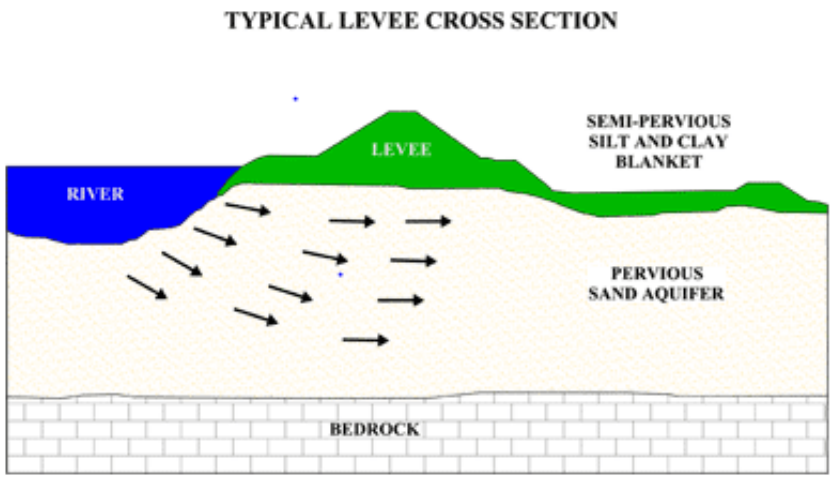


Figure 3a: Levee under normal conditions.

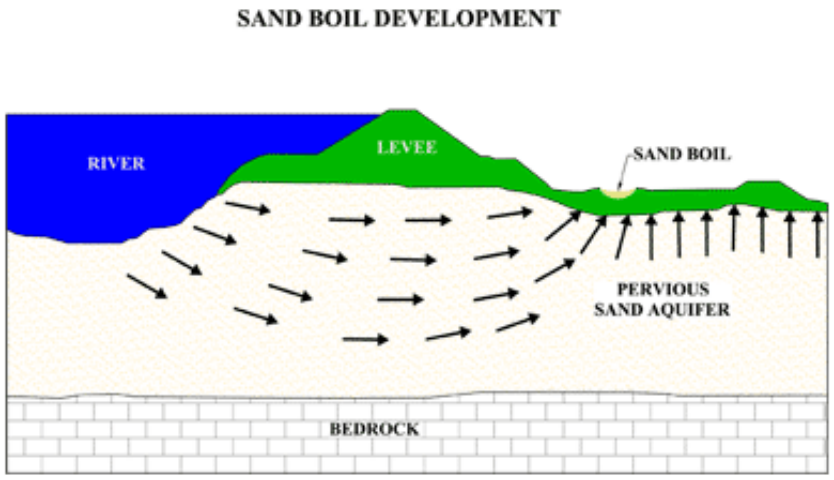


Figure 3b: Potential for underseepage due to high water.

Sandbag Barrier Failure

Example of Sandbag Ring Levee

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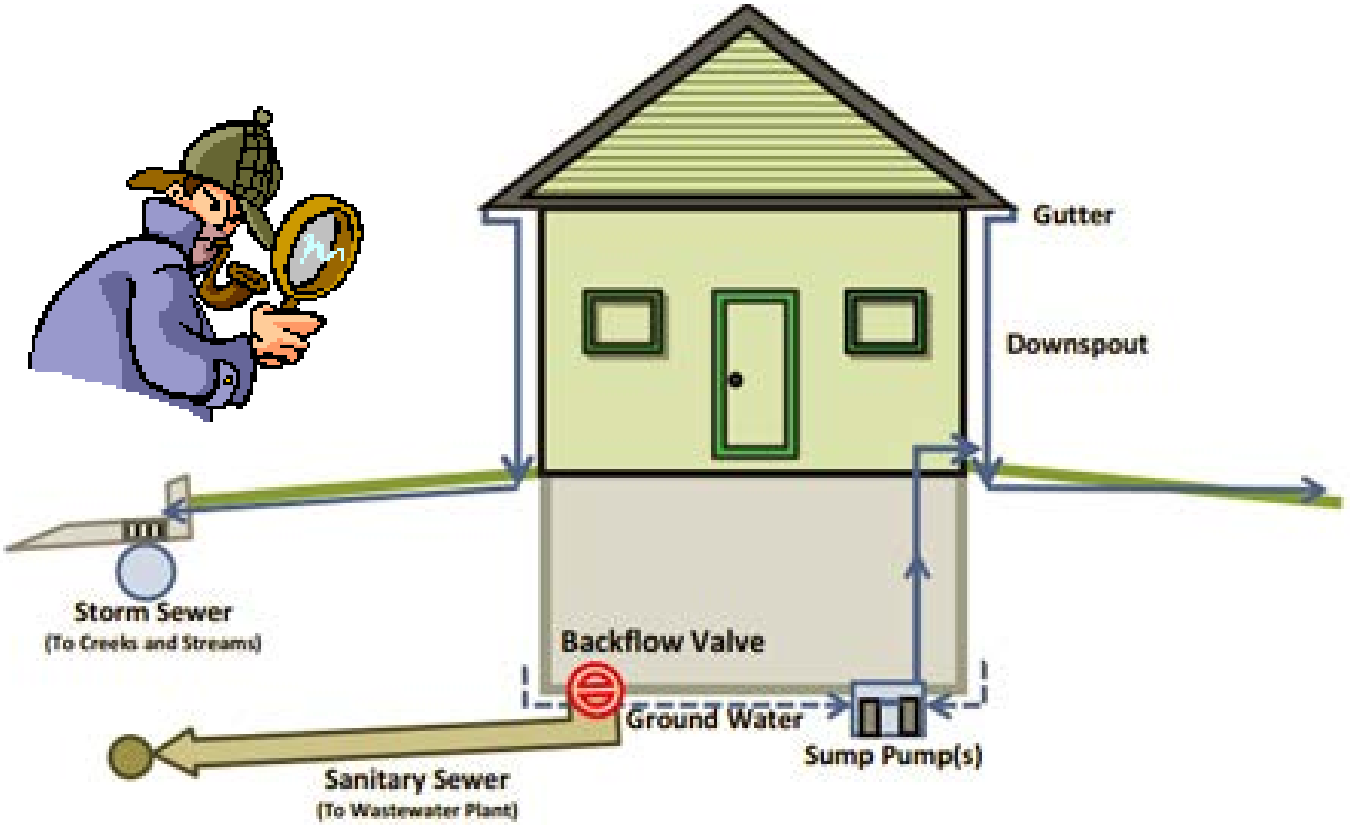
Interior Drainage and Pumping

Storm and Sanitary Sewers

Sewer “back-up” and reverse flow into the protected area. Can be manageable with pumps.

Know where these utilities are and keep a watchful eye. Even closed-lids can be surcharged.

Surveillance is Key



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Closure of Gaps

Gaps in the sandbag barrier system that are to be left open primarily for traffic and access until flood stage reaches a critical elevation.

Keep the number and size of gaps to a minimum.

Critical understanding what is necessary for sealing the closure

- Time required to deploy workers to the site and conduct closure
- Required materials needed
- How fast the flood water is rising
- How high to build the closure

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Questions?

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